

AMENDMENTS TO THE DRAWINGS:

Please add new FIG. 3 to the application which is on the "New Sheet" of drawings in the Appendix attached hereto. This new FIG. 3 shows a Fresnel lens sheet according to the present invention, having light diffusible fine particles. Noting, for example, the last full paragraph on page 5 of Applicants' specification, together with, for example, Examples 1 and 2 on pages 10 and 11 thereof, it is respectfully submitted that new FIG. 3 does not add new matter to the application.

REMARKS

Applicants have amended the drawings to add a new FIG. 3, showing light diffusible fine particles as recited in, for example, claim 2. Noting, for example, the sole full paragraph on page 5, as well as, for example, Examples 1 and 2 on pages 10 and 11, of Applicants' specification, it is respectfully submitted that the new drawing FIG. 3 does not add new matter to the application.

Applicants have amended the specification in light of newly submitted FIG. 3. That is, Applicants have amended the "Brief Description of the Drawings" to add a brief description of FIG. 3; and have amended the sole full paragraph on page 5 of Applicants' specification, to provide a reference character for the light diffusible fine particles and, in connection therewith, to refer to FIG. 3. It is respectfully submitted that these amendments to the specification are consistent with new FIG. 3, and it is respectfully submitted that these amendments to the specification do not add new matter to the application.

Applicants have amended their claims in order to further clarify the definition of various aspects of the present invention. Specifically, Applicants have amended claim 1 to recite that the specified surface of the light source side has "a rugged structure", with the recited average pitch and 10 point roughness. Note, for example, the paragraph bridging pages 4 and 5, as well as the sole full paragraph on page 5, of Applicants' specification. Moreover, Applicants have amended claims 2, 10, 17 and 18 to recite amount of light diffusible fine particles included in the substrate, consistent with the description in the last three on page 5 of Applicants' specification.

In addition, Applicants are adding new claims 19-25 to the application. Claim 19, dependent on claim 1, recites that the rugged structure has such a height that labyrinth light within the Fresnel lens sheet and a reflected light from surfaces

thereof are diffused. Note, for example, the paragraph bridging pages 4 and 5 of Applicants specification. Claim 20 recites the same subject matter as set forth in claim 9, but is dependent on claim 19. Claim 21, dependent on claim 1, further defines the average pitch and 10 point roughness of the surface of the light source side, consistent with the description on page 5, lines 7-11, of Applicants' specification; and claims 22-25, dependent respectively on claims 2, 10, 17 and 18, further define amount of the light diffusible fine particles included, consistent with the description in the first three lines on page 6 of Applicants' specification.

In view of the presently submitted New Sheet of drawings, and amendments to the specification corresponding thereto, it is respectfully submitted that the objection to the drawings as set forth on pages 2 and 3 of the Office Action mailed June 2, 2005, is moot.

Applicants respectfully traverse the objection to claims 3, 4, 11 and 12, as set forth on page 2 of the Office Action mailed June 2, 2005, particularly in view of the following. Thus, the Examiner contends that it is unclear how a 10 point roughness of 3 μm may be obtained from a roller with a 6 μm roughness.

However, it is respectfully submitted that in formation of the surface by means of a roller, the surface is not necessarily formed with the corresponding roughness of the roller. That is, it is respectfully submitted that various factors have an effect on the 10 point roughness of the surface, and that the roughness of the surface will not necessarily be that of the roller, as would have been known by one of ordinary skill in the art. For example, forming a surface state (e.g., height) different from a surface depth (e.g., depth) of the roller can be achieved by controlling the amount of melted resin, and/or, e.g., by an effect of contraction of the resin, as would have been known by one of ordinary skill in the art.

In this regard, attention is respectfully directed to U.S. Patent No. 5,751,478 to Yoshimura, et al., applied by the Examiner in rejecting claims in the above-identified application. Yoshimura, et al. discloses that a vertical lenticular lens with 3 μm in height of hills at its center in the width direction, and 5.0 μm in height of hills at a position of 280 mm from its center in the width direction, can be obtained by means of a metal roller with a pattern having a negative shape of the vertical lenticular lens having a constant lens depth of 5.0 μm , and by controlling the amount of melt resin. Note, for example, column 7, lines 26-47 of Yoshimura, et al.

Thus, it is respectfully submitted that one of ordinary skill in the art would have known how to achieve such surface of the light source side as in the present claims, using a metallic roller and with guidance as in the present disclosure, and that, in particular, a surface having a 10 point roughness of 3-15 μm can be obtained by molding with the use of a metallic roller having a surface width of 10 point roughness of 6-15 μm . In this regard, note that Applicants provide a positive description of forming a surface with such 10 point roughness using a roller of 10 point roughness of 6-15 μm , and the Examiner has provided no evidence or reasoning for doubting this description. See In re Bowen, 181 USPQ 48 (CCPA 1974); In re Dinh-Nguyen, 181 USPQ 46 (CCPA 1974).

Applicants respectfully submit that all of the claims presented for consideration by the Examiner patentably distinguish over the teachings of the references applied by the Examiner in rejecting claims in the Office Action mailed June 2, 2005, that is, the teachings of the U.S. patents to Yoshimura, et al., No. 5,751,478, to Kamiya, et al., No. 6,663,953, and to Watanabe, et al., No. 5,513,036, under the provisions of 35 USC 102 and 35 USC 103.

Initially, Applicants note with thanks the indication by the Examiner that claims 2, 4, 6, 8, 10, 12, 14 and 16-18 would be allowable if rewritten in independent form. However, please note that claims 17 and 18 are process claims, and are already in independent form, and it is respectfully submitted that claims 17 and 18 should be allowed.

Moreover, as will be shown infra, it is respectfully submitted that claim 1 should be allowed, such that all of claims 2-16 should also be allowable without objection thereto.

With respect to the rejected claims, it is respectfully submitted that the teachings of the applied references would have neither taught nor would have suggested such a Fresnel lens sheet as in the present claims, whose surface has a rugged structure, and having the recited average pitch and 10 point roughness. See claim 1.

Furthermore, it is respectfully submitted that the teachings of the applied references would have neither disclosed nor would have suggested such Fresnel lens sheet, or such rear projection screen including this Fresnel lens sheet, the lens sheet having features as discussed previously in connection with claim 1, and wherein the Fresnel lens substrate includes a thermoplastic resin obtained by molding with the use of the metallic roller as set forth in claims 3 and 11; and/or wherein the Fresnel lens substrate includes a copolymer resin of methyl methacrylate and styrene (see claims 5, 7, 13 and 15).

The present invention is directed to a Fresnel lens sheet, and a rear projection screen for a rear projection television using such lens sheet.

A rear projection screen employed for a rear projection television is usually obtained by assembling a Fresnel lens sheet and a lenticular lens sheet. However, a

light reflection on the surface of the Fresnel lens sheet, and a labyrinth light inside the Fresnel lens sheet, cause distortions on the projected image. That is, especially in the case where the screen of the rear projection television is watched from a lower level, the projected image on the upper area of the screen has multiple images, generally called ghosts. Such ghosts are considered to appear due to the labyrinth light within the Fresnel lens sheet and the reflected light from the surface of the light source side of the Fresnel lens sheet reflecting back on a reflection mirror and then entering the Fresnel lens sheet again. This problem of ghosts has been exacerbated in recent years, in view of improvements in luminance of the light source.

While various techniques have been proposed for overcoming the ghost problems, as described, for example, in the paragraph bridging pages 2 and 3 of Applicants' specification, such techniques have been insufficient, particularly with respect to recent rear projection televisions employing recent light sources with highly elevated luminance.

Against this background, Applicants provide a Fresnel lens sheet, and a rear projection screen utilizing such lens sheet, overcoming problems including the aforementioned ghosts, and wherein the lens sheet can be easily provided. Applicants have found that by forming the lens sheet having a surface of the light source side with a rugged structure, with an average pitch of 200 μm or smaller and 10 point roughness of 3-15 μm , problems in connection with prior structures are avoided. In particular, the ghost light becomes so weak that it essentially is not observed. Thus, Applicants provide a surface wherein labyrinth light within the Fresnel lens sheet and a reflected light from the surface are effectively diffused; and, moreover, the pitch of the surface of the light source side is sufficiently small so as to

avoid observation of the rugged structure. Note, for example, the paragraph bridging pages 4 and 5 of Applicants' specification.

As for advantages achieved according to the present invention, attention is respectfully directed to the Examples and Comparative Examples on pages 10-13 of Applicants' specification, and the results shown in Table 1 on page 14 thereof. As can be seen therein, with use of the Fresnel lens sheet and rear projection screen in accordance with the present invention, labyrinth light inside the screen and a surface reflection are diffused effectively, and a ghost caused by them is remarkably reduced; and, accordingly, a rear projection television employing a Fresnel lens sheet and the rear projection screen of the present invention provides excellent images without ghost light.

Yoshimura, et al. discloses a rear-projection screen comprised of at least a Fresnel lens and a light-diffusing member such as a lenticular lens, and wherein the screen has light diffusion properties greater at its upper and lower end portions than at its middle portion. See column 2, lines 6-11. As an embodiment, this patent discloses that the screen includes a Fresnel lens and a light-diffusing member, wherein the light-diffusing member contains light-diffusing fine particles as a means for diffusing light in the vertical direction; and in another embodiment, this patent discloses a vertical lenticular lens that diffuses light in the vertical direction, the vertical lenticular lens having vertical-direction light diffusion properties greater at its upper and lower end portions than at its middle portion. See column 2, lines 6-22. Note also column 2, lines 58-63; and column 3, lines 43-47 and 58-62.

It is respectfully submitted that Yoshimura, et al. would have neither disclosed nor would have suggested such a Fresnel lens sheet as in the present claims,

having the surface of the light source side with a rugged structure, much less such surface having the average pitch and 10 point roughness as in claim 1.

As applied by the Examiner, Yoshimura, et al. discloses a Fresnel lens 1, with a vertical lenticular lens 4 as a light-diffusing member, having a specified surface configuration. It is emphasized that such structure described in Yoshimura, et al. has a lenticular lens with differences thereof at center and upper and lower portions of the lens. It is respectfully submitted that such lenticular lens would have neither taught nor would have suggested, and in fact would have taught away from, the rugged structure (e.g., uneven, rough, irregular, etc.) surface, much less the pitch and 10 point roughness as in the present claims.

It is emphasized that Yoshimura, et al. is primarily concerned with controlling the visual angle in the vertical direction without causing a decrease in the peak gain, by utilizing a vertical lenticular lens characterized by having vertical-direction light diffusion properties greater at upper and lower end portions than at its middle portion. In contrast, the present invention provides a method of avoiding ghosts, achieved by employing the surface of the light source side having a rugged structure, scattering light to various directions (not just vertical directions). It is respectfully submitted that Yoshimura, et al. does not address the problem addressed by the present invention, addressing a different problem, and it is respectfully submitted that the teachings of Yoshimura, et al. would have neither disclosed nor would have suggested the present invention, including the solution to the "ghost" problem, and advantageous results achieved thereby.

It is respectfully submitted that the additional teachings of Kamiya, et al. would not have rectified the deficiencies of Yoshimura, et al., such that the presently

claimed invention as a whole would have been obvious to one of ordinary skill in the art.

Kamiya, et al. discloses a Fresnel lens base sheet which can be used as screens of projection televisions, microfilm readers or the like, the base sheet being described most generally at column 2, lines 18-62. Such base sheet has a styrene resin as a continuous phase, with rubber-like elastic material as dispersed particles. This patent goes on to describe that the Fresnel lens base sheet is preferably a base sheet for a light-diffusive Fresnel lens suitable for the formation of a lens layer of an ultraviolet-cured resin. Note also from column 2, line 63 to column 3, line 8. Note also the paragraph bridging columns 3 and 4, and column 4, lines 21-27 and 32-35. This patent also discloses the addition of transparent fine particles, as discussed in the paragraph bridging columns 2 and 3, and in column 5, lines 19-25, of Kamiya, et al.

Even assuming, arguendo, that the teachings of Kamiya, et al. were properly combinable with the teachings of Yoshimura, et al., it is respectfully submitted that the combined teachings of these references would have neither disclosed nor would have suggested the presently claimed structure, including wherein the surface of the light source side of the claimed sheet has a rugged structure, especially with the pitch and 10 point roughness as in the present claims, and advantages thereof as discussed previously.

Watanabe, et al. discloses a projection screen used for a rear projection type television set, having a plurality of lens sheets, and wherein the lens sheets are arranged in the order of a lenticular lens sheet, a linear Fresnel lens sheet and a circular Fresnel lens sheet when seen from a viewer side. See column 2, lines 14-19.

It is respectfully submitted that the teachings of Watanabe, et al. would have neither taught nor would have suggested such Fresnel lens sheet, or such rear projection screen using such Fresnel lens sheet, as in the present claims, including wherein the surface of the light source side has a rugged structure, much less having such rugged structure with the presently recited average pitch and 10 point roughness, and advantages thereof, including avoidance of ghosts due to having sufficient and effective light diffusion.

It is respectfully submitted that the object of Watanabe, et al. is to provide a projection screen in which the optical axis of the incident light can be adjusted at any desired angle with respect to the normal line to the screen surface, without reducing picture brightness and without causing any brightness and color non-uniformity at different positions. It is respectfully submitted that Watanabe, et al. does not address the "ghost" problem addressed by the present invention, as discussed previously, and it is respectfully submitted that Watanabe, et al. would have neither taught nor would have suggested the presently claimed structure, and advantages thereof in overcoming the "ghost" problem.

In addition, it is respectfully submitted that Watanabe, et al. is silent about the surface structure of the light source side of the linear Fresnel lens sheet and of the circular Fresnel lens sheet, and it is respectfully submitted that this patent would have neither taught nor would have suggested the rugged structure of the surface of the light source side as in the present claims, and advantages thereof as discussed previously.

It is respectfully submitted that the additional teachings of Kamiya, et al. would not have rectified the deficiencies of Watanabe, et al, such that the presently claimed invention would have been obvious to one of ordinary skill in the art.

Kamiya, et al. has been previously discussed.


Even assuming, arguendo, that the teachings of Kamiya, et al. were properly combinable with the teachings of Watanabe, et al., such combined teachings would have neither disclosed nor would have suggested such Fresnel lens sheet or such rear projection screen including such Fresnel lens sheet as in the present claims, having the surface of the light source side which has a rugged structure, especially with pitch and 10 point roughness as in the present claims, and advantages thereof.

In view of the foregoing comments and amendments, reconsideration and allowance of all claims presently pending in the above-identified application are respectfully requested.

Applicants request any shortage of fees due in connection with the filing of this paper be charged to the Deposit Account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (case 396.43512X00), and credit any excess payment of fees to such Deposit Account.

Respectfully submitted,

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Attachment: Appendix (New Sheet, FIG. 3)

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